

# PATENT SPECIFICATION



Application Date: Feb. 29, 1928. No. 28,440/28.

301,719

(Divided out of No. 299,735.)

Complete Accepted: Dec. 6, 1928.

## COMPLETE SPECIFICATION.

### Improvements in Cathode Ray Tubes.

I, HAROLD EDWIN POTTS, M.Sc., Chartered Patent Agent, of 12, Church Street, Liverpool, in the County of Lancaster, subject of the King of Great Britain, do hereby declare the nature of this invention, which has been communicated to me by Hermann Plauson, a citizen of Esthonia, of Hagedornstrasse 51, Hamburg 37, Germany, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates to improvements in cathode ray tubes, and particularly to improvements in the metal windows of cathode ray tubes.

The principle on which cathode ray tubes operate is that a cathode, usually of the emissive variety, is enclosed in a highly evacuated tube and the other end of the tube is closed with a window, penetrable to the cathode rays without offering too great a resistance to their passage. A high voltage is then applied across the window and the cathode, accelerating the rays to a high velocity.

It has been usual to construct the window of thin metal foil, and it has been suggested to use thin sheet molybdenum, copper, nickel, or aluminium. Aluminium is unsuitable as it rapidly loses its ductility as the temperature rises, while the other metals have to be very thin or, owing to their high atomic weight, the rays are retarded considerably. Where the window is of large area, it has been proposed to support a window of molybdenum foil against the external pressure on a grating of molybdenum.

According to the present invention the element beryllium is used as a material for the windows of cathode ray tubes.

A further feature of the invention is the use of an alloy of beryllium, e.g. beryllium, aluminium, and magnesium in which beryllium predominates, as a material for the windows of a cathode ray tube.

A still further feature of the invention consists in protecting the surface of the window foil, and particularly the outer surface which is likely to be exposed to

the materials in a reaction vessel, with a thin deposit or coating of a resistant metal.

Among the advantages of windows constructed according to the present invention is that the window, being more penetrable to the cathode rays than the metals with a much higher atomic number such as have been previously used, can be made thicker and more robust, e.g. a window of beryllium, aluminium foil 0.05 to 0.1 mm. thick has about the same penetrability to cathode rays as a window of nickel foil 0.005 mm. thick. The alloy preferably contains from 95—98% of beryllium and from 2—5% of aluminium, and small quantities of magnesium may also be added. In order to protect the surface of the membrane from chemical action a thin deposit of gold 0.001—0.0015 mm. thick may be applied, or platinum, nickel, cobalt, or other inactive metals may be used according to circumstances, but with the heavy metals the coating should not be so thick as to cut down the strength of the  $\beta$ -rays by an appreciable amount.

When the size of the window is large or the velocity of the cathode particles is high, the window should be cooled by suitable cooling means. In my co-pending Application Serial No. 14,539/27 (Serial No. 299,735) a system is described in which the cooling coil forms the grating for supporting the foil.

The invention is applicable to cathode ray tubes of all types, but I do not claim the application to cathode ray apparatus of the type claimed in my co-pending Application Serial No. 14,539/27 (Serial No. 299,735).

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, as communicated to me by my foreign correspondent, I declare that what I claim is:—

1. Cathode ray tubes in which the window through which the rays pass is of beryllium or an alloy consisting principally of beryllium substantially as described.

2. Cathode ray tubes as claimed in Claim 1 in which the window is coated

with a thin protective layer of a resistant metal substantially as described.

3. In a cathode ray tube, a window of beryllium.

5 4. In a cathode ray tube, a window of an alloy which contains a high proportion of beryllium.

5. A method of protecting the window

of a cathode ray tube, which consists in coating the window with a relatively thin layer of a resistant metal. 10

Dated this 3rd day of October, 1928.

W. P. THOMPSON & Co.,

12, Church Street, Liverpool,

Chartered and Registered Patent Agents.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1928.